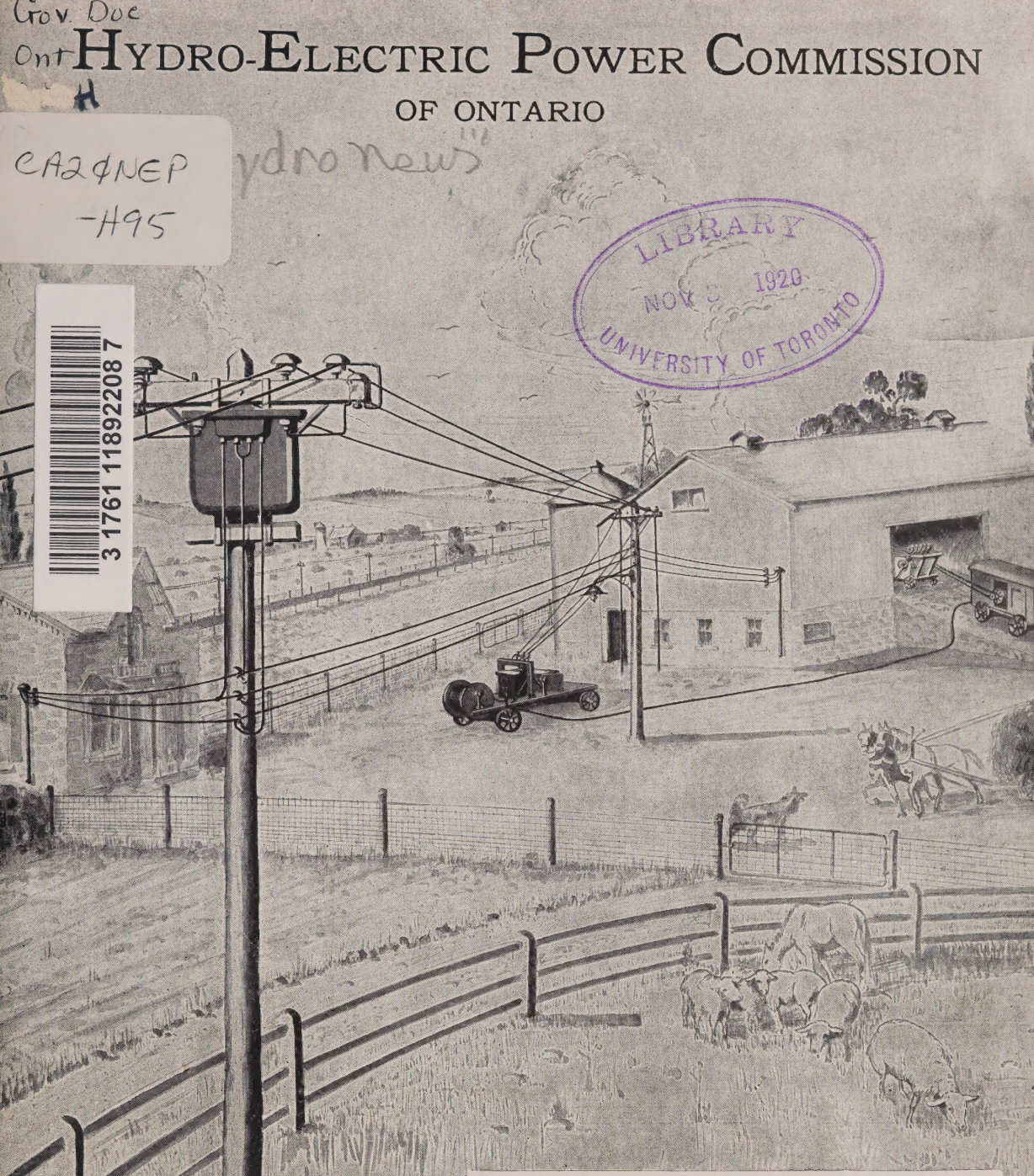
HYDRO-ELECTRIC POWER COMMISSION

OF ONTARIO



THE BULLETIN

AUGUST, 1920

Vol. VII. No. 6

RURAL POWER NUMBER

THE BULLETIN

PUBLISHED MONTHLY BY THE

Hydro-Electric Power Commission of Ontario

ADMINISTRATION BUILDING
190 UNIVERSITY AVE.
TORONTO

SUBSCRIPTION PRICE:
TWO DOLLARS PER YEAR

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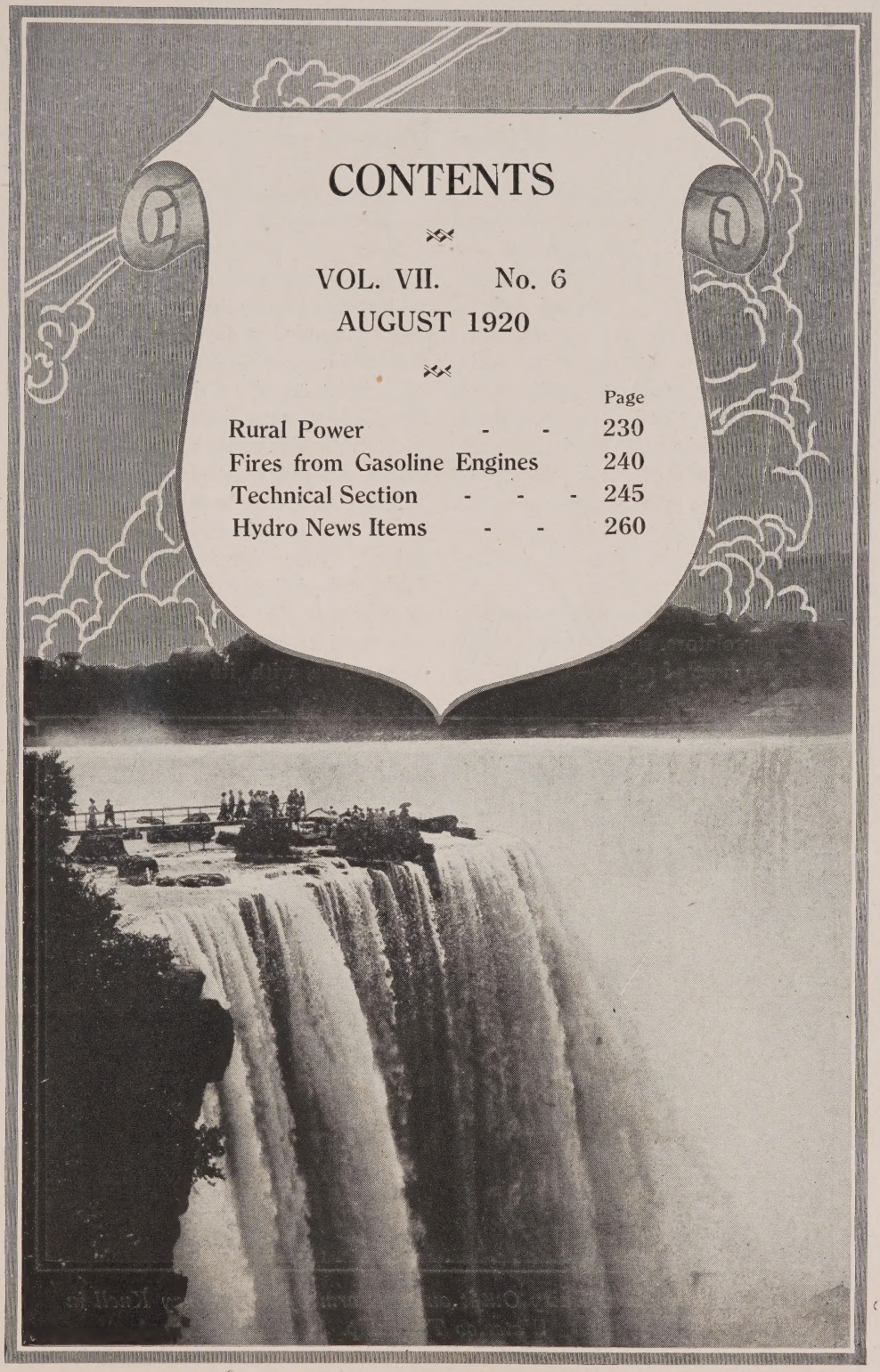
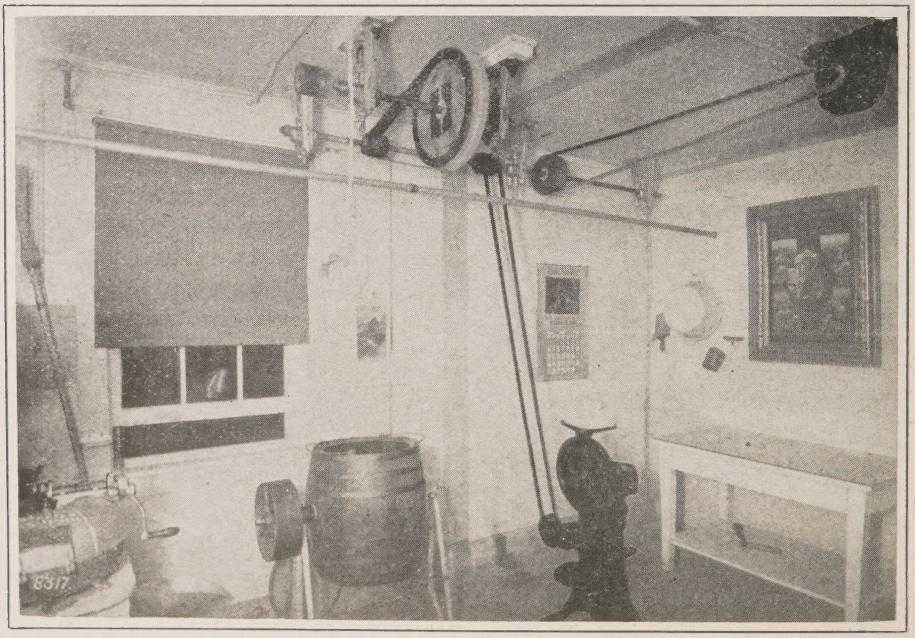


Rural Power

DO IT ELECTRICALLY. For some years this has been the slogan of the central service stations, and of every manufacturer and distributor of electrical appliances. Newspapers, magazines and billboards are filled with advertising matter exploiting the merits of electric lighting and of every conceivable electrically operated device, grinders, choppers, pumps, milking machines, cream separators, churns, washing machines, dish washers, stoves and all sorts of cooking utensils, heaters, irons, percolators, fans, vacuum cleaners and a host of others—all with the aim of educating the people and creating a demand for their use.

In the cities and towns where power is usually available at a price easily within the reach of all, the people have responded to such an extent that the facilities of the manufacturers have been taxed to the utmost; the installations being limited only by the inability to obtain the appliances or to obtain power to operate them.

Now what has been the effect of all this propaganda on the rural population? They have the telephone, daily mail delivery, and automobiles to run in to the picture show one or two evenings a week, when the electrical store with its windows filled



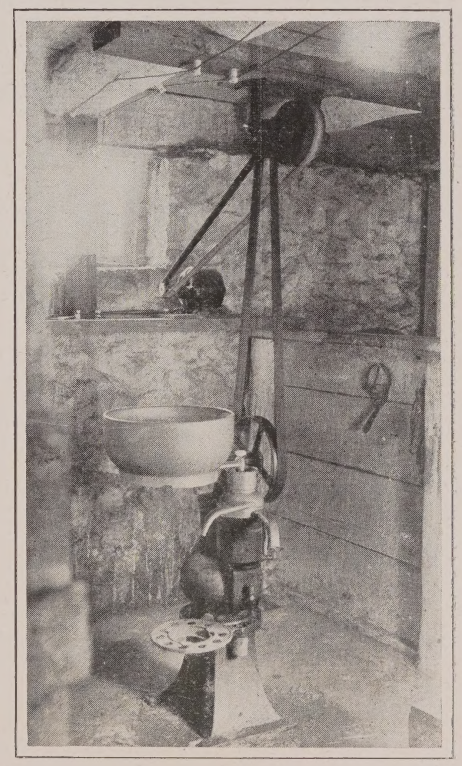
Electrically Operated Dairy Outfit on the Farm of Mr. Henry Knell in Waterloo Township.

with brightly colored lights and household appliances is the most outstanding sight in town, and a constant reminder of the smoky oil lamps at home, and the daily task of filling lamps and cleaning chimneys, and discovering on Saturday morning that somebody forgot to take the oil can to town on the last trip and the family must get along with two lamps for the next few days. Is it any wonder that they ask why this wonderful electrical service is not available in the country, and grow more restive to share in this, one of the greatest gifts of nature?

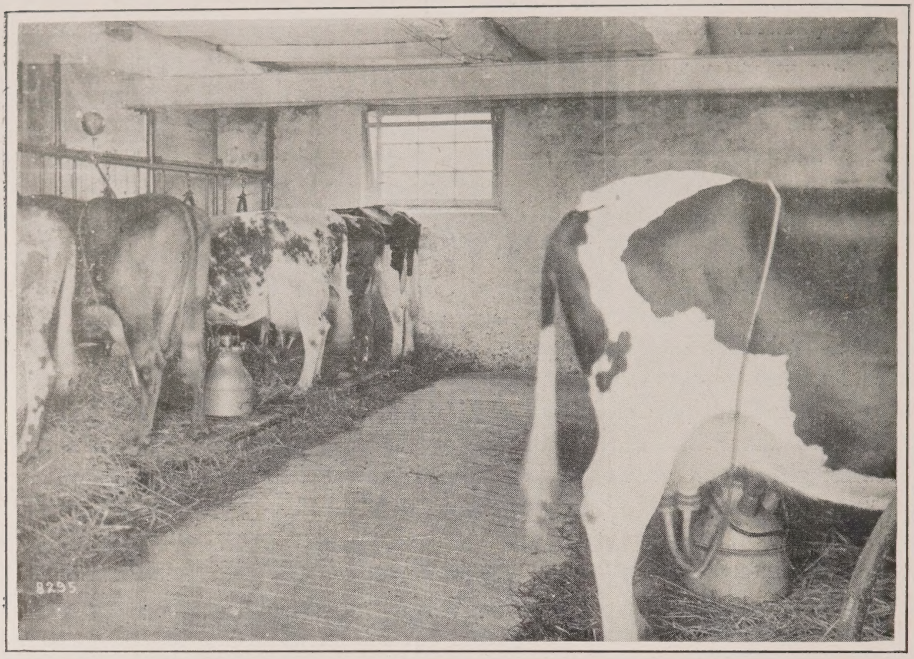
No more important work can be done by any statesman than to increase the interest in rural life. The attraction of high wages, short hours of labor and social advantages each year transfers from the farms to the cities a very considerable part of its greatest asset, young manhood and young womanhood, and the general availability of modern electrical conveniences on the farm, in both barn and house, would do away with much of the drudgery and make life more attractive. Anything tending to this end must have a vital influence on the prosperity and happiness of the community.

Hydro power for the rural districts and on the farm has been much talked of. The demand is urgent and insistent, and while many such districts are receiving Hydro service, and thousands of farm buildings and hamlet homes are being lighted nightly by the magic white coal, the percentage of applicants who were so situated as to be able to receive service is so small as to be practically negligible. This is because, with a few exceptions of thickly settled districts in proximity to the larger cities, there was no general plan for serving an entire rural community.

Generally speaking, the services already installed, were planned on the line of least resistance. Out of every urban centre there are one or more roads on which, due to the character of the country or the kind of farming followed, residences are built much closer than the average of country roads. The first Rural Act passed in 1911 enabled one or more property owners in a township to petition for Hydro service. The cost of the dis-



Farm Dairy on the Farm of Mr. John Karn in West Oxford Township.



Electric Milking Machines in Operation.

tributing system necessary to serve them from the municipal limits was financed by a township debenture extending over a term of twenty years, and the petitioners signed twenty-year contracts obligating themselves to pay for their current at cost at the municipal limit plus the carrying charges on the special line serving them. Under this plan the cost was directly proportioned to the number of consumers per mile. Ordinarily, this plan worked out to a feasible rate with three consumers per mile, and each additional consumer reduced the cost proportionately and while based on this plan many hundreds of farms are enjoying the benefits of Hydro service on the principal roads running out of Hydro municipalities, the service was confined exclusively to such roads.

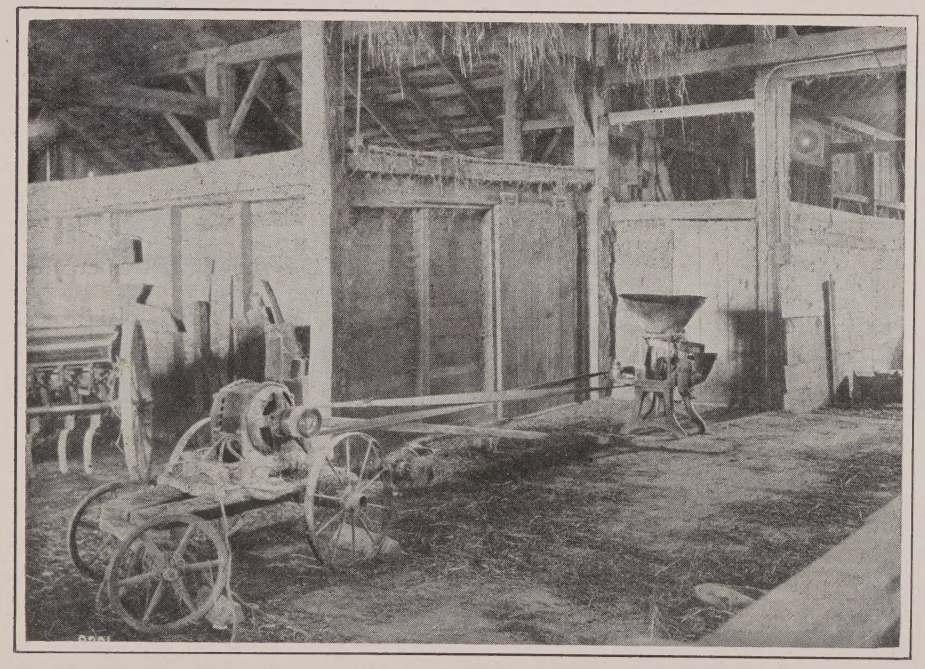
It was soon apparent that this plan could not be made to serve the general farming community, and it became the cause of general dissatisfaction. The sale value of a farm with Hydro service available, increased at least a thousand dollars over other similar property not so fortunately located, and on the less thickly settled roads, no practicable rate could be worked out. Ten farmers living on ten different roads, each one mile from the municipal limit, would each have to pay a different rate for the same service and in some cases the cost was prohibitive. To overcome these objections and to make possible the more general extension of Hydro service into rural and farm homes, the

Commission has worked out a new and comprehensive plan which was approved as an amendment to the Power Commission Act at the last session of the Provincial Legislature. Briefly stated, the plan is as follows:

In every case where a petition for service is received from the ratepayers in any rural district, the Commission arranges for a study or survey of the district represented by the limit of economic distribution from the nearest urban centre. This district will conform to natural conditions without regard to geographical lines. It may be all of one township or an irregular part of several—the only limit being the distance the current can be carried at low voltage. The value and character of the land and buildings on each farm, the economic value of electric service in each case, and the probability of each resident taking one of the eight different classes of service is considered, and an estimate is made of the cost of building a distribution system to serve the entire district.

A rate is then struck for each class of service, on the assumption that a certain percent of the residents in the district contract to take service and this rate is available to anyone located within the district. As the percentage of consumers increases, the rate automatically decreases until the maximum of services at the minimum cost is reached.

To avoid the complications due to municipal financing of rural districts covering irregular parts of several townships, the Commission will fin-



Portable Motor Operating Feed Cutter.

ance and operate these systems, the cost of power, operation, maintenance and fixed charges on the cost of the system being included in the bills rendered direct to the consumers, the contracts with the townships involved carrying a provision that any arrears for such service shall be entered on the collectors' roll of the municipality and collected as taxes.

The above very briefly outlines the policy under which the Commission hopes to extend the rural service until electric energy is available throughout a large part of the more thickly settled districts of the Province.

Each District Co-operative and Complete in Itself.

The Commission will construct all transmission lines built upon the highways or right of way secured for such line, and install the necessary transformers and meters on the consumer's premises. The consumer will pay outright for the cost of his service from the highway as well as all installation and wiring in his building.

Each prospective consumer in a district is vitally interested in the cost of the system, the carrying charges on which must be met out of the bills which he pays. Co-operative contributions towards the cost of the line in the way of teaming poles, wire, transformers and other supplies, and labor for digging poles would materially reduce the cost per mile, and the amount which would have to be provided each year, and the extent to which such service is offered lies entirely with the district.

Rates.

All rural consumers will be placed in one of the following classes, according to the character of the service.

Class	Service	Class Demand	
		Kilowatts	Horsepower
1	*Hamlet lighting* (3 or more buildings grouped)	.75	1
2	*House lighting* (Separate country houses but not including farm residences)	1.	1.3
3	*Farm lighting* (Lighting and small equipment in a farm residence, outbuildings and barn, but no motor or range)	2.	2.7
4	*Lighting and Cooking* (Same as Class 3 with the addition of an electric range)	5.	6.7
5	*Light farm service* (Same as Class 3 with the addition of a 5 H.P. motor)	5.	6.7
6	*Medium farm service* (Same as Class 3 with a 5 H.P. motor and electric range, or a 10 H.P. motor and no range or heaters	9.	12.
7	*Heavy farm service* (Any installations up to class demand shown)	15.	20.
8	*Syndicate outfits* (Special)	—	—

Each customer will be billed a service charge intended to cover the carrying charges on his share of the general transmission line, as well as the individual transformer and meter installation necessary to provide for the class of service contracted for. There will also be a consumption charge for the kilowatt hours used, intended to cover the cost of power.

These two charges are closely related, and must cover the entire cost of the service. They follow the principle used in billing power consumers since the advent of Hydro, the equity of which has never been questioned.

When the actual cost of operating each district is determined at the end of each year and is set against the revenue, the equity of the rates will be apparent. If there is a surplus, the consumers in that district are entitled to a reduction—if a deficit the rates will be raised, but in each case, by a percentage applying alike to all classes of consumers. Each additional consumer, by assuming his share of the common transmission lines, will automatically reduce the cost to everyone.

Procedure to Obtain Rural Power.

All of the legislation dealing with this subject is quoted elsewhere in this Bulletin. The necessary procedure briefly stated is as follows:

When a group of individuals in any district is desirous of having Hydro power, they should circulate a suitable petition, a supply of which can be obtained from this Commission, and secure the names of as many residents in the district as possible. When completed, the petition should be submitted to the township council, which is authorized under the Act to forward it to this Commission with a resolution asking for an estimate of the cost of the service.

After the necessary survey has been made, the Commission will furnish the township council an estimate of the costs and rate, and representatives of the Commission will, when requested, meet the petitioners and others, and explain the estimates and rates in detail.

If the rates submitted are satisfactory to a sufficient number of the petitioners, they may at once sign the standard form of contract with the township officials, after which the township officials can enter into a contract with this Commission for the construction of the system, and the necessary supply of power.

All of the necessary forms are kept in stock by this Commission and will be gladly furnished on request, together with detailed instructions as to the best plan of procedure in each case.

Legislation Concerning Supply of Power to Rural Districts

IN 1911, the Provincial Legislature passed a bill amending the Power Commission Act, under which amendment, one or more ratepayers in a municipality in a township might petition the Commission to obtain a supply of power. Under this amendment one or more petitioners in a township wishing to obtain a supply of power might sign a petition to be presented to the township council, which, on receipt of same, should request the Commission to furnish estimates of the cost of supplying the power required. After these estimates were received from the Commission, at a special meeting called for that purpose, the township council would then submit the rates to the petitioners, all of whom had been previously notified of this meeting, and if the estimates were satisfactory to the petitioners and they agreed to sign contracts with the township council to take power from the Commission at the rates submitted, the township council without submitting the matter to a vote of the electors and without any other formalities required in the case of a By-law passed under the Power Commission Act might pass a By-law for entering into a contract with the Commission for power to supply the applicants.

The Act also provides for the admission, from time to time, of further subscribers, and also provides for the issue of twenty year debentures to pay for the cost of constructing the necessary lines and equipment, and, also, stipulates that the amounts payable by the applicants should be sufficient to recoup the municipality for the amount required to meet the debenture charges, and also to meet the cost of power operation, maintenance, etc. on lines and equipment installed to supply same.

Under this Act, lines were constructed to supply a large number of rural petitioners, who are now being

supplied by the Commisison in different parts of the Province. It has been found, however, that under this scheme, as set out in the above mentioned amendment to the Power Commission Act, that service to rural consumers was confined to the main, more thickly settled roads running out of, and adjoining Hydro municipalities and power distribution centres, and it became apparent that this plan of supplying rural service was not satisfactory in that it did not permit of economically and impartially serving the general farming community throughout the Province.

In 1920, at the Commission's request, the Provincial Legislature passed a bill amending the Power Commission Act as regards the supply of power to rural districts. The basis on which this amendment was made differs from the former amendment in that the districts supplied are not limited by geographic township boundaries, but by the limit of economic distribution from the nearest power distribution centre. This act is as follows:—

Part II.-b
Construction and Operation of Distribution Works in Rural Power Districts.

Contracts for Construction and operation of distribution works in townships.

30e.—Subject to the approval of the Lieutenant-Governor in Council, the Commission may enter into a contract with the municipal corporation of a township or with a municipal corporation of two or more townships for the supply and distribution of electrical power or energy in a defined area (hereinafter called a rural power district), including a part of such township or parts of each of such townships, and the Commission may, in pursuance of such contract, construct and operate all works necessary for the transmission of electrical power or energy to the rural power district and for the transforming and distributing of such electrical power or energy to the premises of the persons within the rural power district as so defined or as enlarged or altered from time to time by the Commission with the approval of the Lieutennant-Governor in Council and the municipal council or councils;

By-Law.

30f.—The council of the township or the council of each of such townships party to such contract, may pass a by-law for entering into such contract and may execute the same, and it shall not be necessary to submit any such by-law to the vote of the electors or to comply with any of the other forms required in the case of a by-law passed under Part 1 of this Act;

Apportionment of cost on annual adjustment

30g. (1)—The Commission shall annually fix, adjust and apportion the cost of all the works mentioned in section 30e to be borne by each of the municipal corporations entering into such contracts;

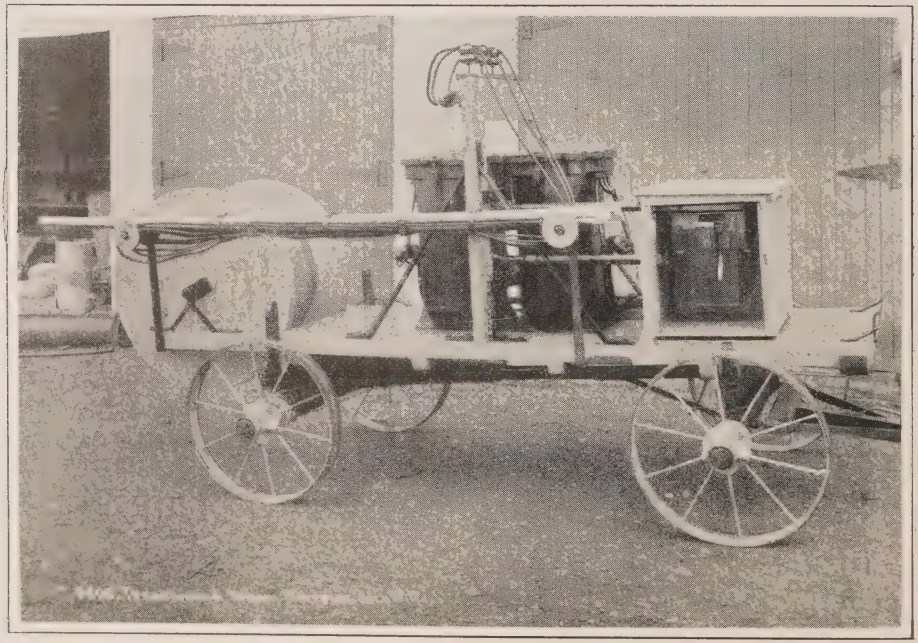
(2)—The total amount for which each of the corporations shall be liable shall include a sum sufficient to provide annually the corporation's proportionate cost of the capital cost of the work so as to form in thirty years a sinking fund for the payment of the amount expended by the Commission on capital account for the acquisition or construction of the works necessary for transmitting, transforming, distributing and delivering electrical power or energy in a rural power district and a further sum sufficient to pay the Commission interest upon the proportionate part of such expenditure to be borne by the corporation, and a further sum to pay the corporation's proportionate part of the line loss and the costs of operating, maintaining, renewing and insuring of such works and of the other charges set out in section 23;

Rates.

30h.—The rates to be charged to customers receiving electrical power or energy from the Commission in a rural power district shall be fixed by the Commission from time to time and shall be sufficient to provide the sum necessary to pay all the charges to be borne by the corporation under section 30g;

Application of Part 1.

30i.—All of the provisions of Part 1 as to the annual payments to be made by the Corporations which have entered into



Transformer and Cable Wagon of Syndicate Outfit.

contracts with the Commission shall apply to a contract entered into under this Part;

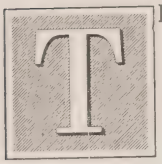
Collection of rates.

30j.—Where any person receiving a supply of electrical power or energy in a rural power district is in default of payment of any account due in respect of such supply, the Commission may notify the corporation of the municipality in which the premises of the person so in default are situate stating the amount due and such amount shall thereupon be entered upon the collectors' roll of the municipality and collected in the same manner as other taxes.

Summarized Procedure for Rural Power, in Steps

1. Circulation of a Petition. (Forms supplied by the Commission upon application of any party interested).
2. Submitting petition to Township Council.
3. Resolution of Council asking Commission to prepare estimate. Certified copy of the resolution, together with petition and maps, etc. must be forwarded to the Commmission.
4. Investigation, collection of data, formation of district and preparation of estimates by the Commission.
5. Forwarding rates to Township Clerk.
6. Submitting rates to petitioners and others, canvassing for contracts.
7. Executing agreement between township and Commission.
8. Construction of lines.

Fires from Gasoline Engines



HE remarkable increase in the use of gasoline for light and power is presenting constant evidence of its being a contributing cause to our fire waste. It is not a new hazard, but it is a rapid development of an old hazard which is materially adding to the number and extent of our fires.

The automobile and the garage are not the only elements creating or adding to this condition, and while the garage hazard requires drastic treatment, we have particularly in mind the menace of the gasoline engine on the farm, and in rural localities.

In our pamphlet on "Fire Prevention on the Farm and Elsewhere," we remark:

"It is an extremely dangerous thing to run . . . a gasoline engine in the barn. Why should you take a chance of losing your season's crops . . . from a back-fire or gasoline explosion?"

"Gas engines should be kept in isolated buildings as far from the barn as possible!"

The following case aptly illustrates and enforces the conclusion there stated.

A fire occurred in Peel County on February 29, 1920, whereby an exceptionally good barn and other outbuildings were destroyed. The value of buildings and contents was in the neighborhood of $18,000; the insurance was $6,500, and the farmer's net loss over and above his insurance was thus about $11,500. Bad luck for the members of the insurance company (which happens to be a farmers' mutual insurance company), the farmer and the county.

Investigation of this fire was made by an officer of this department, who reports as follows:

"The fire originated from a three-horsepower portable gasoline engine. It was set on blocks about fifteen or eighteen inches high on the barn floor, in a recess in the straw mow just off the thresh floor. This recess was about twelve feet square and eight feet high and was enclosed on three sides with one inch lumber walls and had a lumber roof with the cracks between the boards covered to prevent straw and chaff from falling through to the floor surrounding the engine. The recess was open on the side next to the thresh floor. The floor of this recess is said by several to have been kept well swept and clear of any untidyness.

"Mr. M————stated that he had always kept the engine well cleaned and in good working order. He used coal oil for fuel and primed it with gasoline. The exhaust pipe did not extend outside the building. When the engine was first installed the exhaust pipe had passed through a floor underneath the engine about two or three feet into an open shed underneath. Mr. M———did not like having the exhaust pipe going down into this open shed and had noticed some sparks coming from it when it was so located. He had the exhaust pipe cut off so that it did not pass through the floor but terminated within a few inches of the floor and he had a muffler placed on it.

"He himself had started the engine on the day of the fire for the purpose of pumping water and stated that it appeared to be running smoothly. He had been working close to the engine for about ten minutes after starting it and noticed that the oil was feeding properly, and that the engine appeared to be running smoothly. He then went down to the stables and after a few minutes heard his hired man, A—— R——, call 'fire!' Mr. R—— was working at the other end of the thresh floor and when he first saw the fire it was immediately around the engine. Before they were able to extinguish it the blaze had caught on the straw in the mow and was beyond their control. Mr. M—— and R—— immediately started to get as much live stock as possible out of the stables. The buildings were completely consumed by the fire.

"There is no doubt but that the fire originated from the gasoline engine and this is undeniable evidence of the necessity of exercising the very greatest precautions in the installing and use of these engines and the necessity of having the exhaust pipe extend outside the building."

In the same county a similar occurrence took place on January 5, 1920, on another farm and our investigator reports as follows:

"Mr. H— has a portable three-horsepower gasoline engine. This engine had been operated on the thresh floor of the barn and also in other outbuildings of the farm. He has had the engine for about three years, and during that time it had not been cleaned with the exception that the spark plugs had occasionally been cleaned out. On some occasions they had had difficulty in starting the engine, but had not had any previous fires with it.

"About 10 a.m., on January 5th, Mr. H——, filled the two-gallon tank

of the engine with gasoline and in doing so spilled some of the liquid over the machine. He then attempted to start the machine but could not throw the wheel over. The engine backfired, causing the gasoline to ignite. The resulting fire lasted for about fifteen minutes, scorching the walls and low ceiling of the small frame outbuilding in which it was located. Mr. H—— first attempted to extinguish the fire by throwing water on it. On finding that this only helped the fire to spread he threw quantities of snow on it and so succeeded in extinguishing it. In doing this he was slightly burned, and was so overcome with the smoke and fumes that he was confined to his bed for four or five days as a result.

"The frame outbuilding in which the machine was located is situated about fourteen feet from the barn and if Mr. H—— had not succeeded in extinguishing the blaze, it is altogether likely that the barn and other outbuildings would also have been consumed by fire.

"This occurrence supplies ample evidence of the necessity of keeping gasoline engines absolutely clean and in a fireproof enclosure. Mr. H—— himself states that he would not under any circumstances again use the engine in the barn as he now appreciates what a fire menace they are and what a loss he might have sustained."

The moral of both these instances now reported for the information of those interested, is so clear that he who runs may read.—*Public Service Bulletin.*

Railway Fire Hazards

In 1909, the forests of Canada provided 11,000,000 tons of freight for Canadian railways. By 1916, this had been increased to 16,000,000 tons. These figures are a measure of the importance of forests as revenue producers for railways. In addition, railways require immense quantities of timber and lumber for the construction and repair of their lines and equipment.

The officials of privately owned railways have been subject to the regulations of the Railway Commission as regards fire prevention for a number of years and have shown commendable public spirit as well as excellent business insight in their willingness to comply with them. So long as coal is burned by locomotives which pass through forested regions, the danger of fire will always be serious. All brush and inflammable material must be kept cleared for a distance of from 100 to 300 feet from the centre of the track. Speeder, or velocipede patrols must be maintained in forested regions. Special appliances to check sparking must be installed in all locomotives and provision made for competent inspection and repairs. All of these factors involve a large expenditure, but the marked falling off in the number of fires on protected lines has demonstrated the wisdom of it. Constant vigilance is the price of safety. For example, in 1918, the first year inspection of locomotives in New Brunswick was enforced, it was found that 89 per cent. of the locomotives were defective. In one year, this was reduced to 29 per cent.

Hydro-Electric Power Commission
of Ontario
Engineering Department

Col. Sir Adam Beck, K.B., LL.D., CHAIRMAN
Hon. J. B. Lucas, COMMISSIONER
Col. W. K. McNaught, C.M.G., COMMISSIONER
Frederick A. Gaby, CHIEF ENGINEER

190 University Avenue,
Toronto.

ADDRESS REPLY ATTENTION OF

July 16th, 1920.

Dear Sirs:—

Accidents are continually happening in connection with the handling of transformer fuse plugs, and it is usually found that these accidents could have been prevented had the linemen used ordinary precaution. In this connection we are enclosing for your information and assistance some suggestions with regard to handling this type of equipment.

The standard porcelain transformer fuse plug is far from safe and is very apt to be shattered when fuses are blown. Linemen very often have their eyes flashed or come in contact with grounds when pulling fuses and some serious accidents have occurred because of men handling fuse plugs without the use of the safety belt.

We consider that as one item in connection with the accident prevention work the enclosed suggestions should receive considerable attention.

Yours truly,

F. A. Gaby

CHIEF ENGINEER.

Precautions to be Observed when Handling Transformer Fuse Plugs

When pulling or replacing transformer fuse plugs all employees should wear approved rubber gloves and covers. No rubber gloves except those which have been tested at the time they are bought and receive periodic tests should be used, and no rubber gloves should ever be worn without a protective cover.

To protect the eyes in case of a flash due to pulling plugs under load or closing in on a defective transformer, a pair of goggles, the frames of which are non-flammable and in which there is a glass of a canary color, should be used.

Approved goggles, gloves and covers are carried in stock by the Hydro-Electric Power Commission.

It is reasonably safe to operate transformer fuse plugs if the foregoing precautions are taken and the workman uses a body belt in working on a pole, or operates the fuses from a substantial platform, taking the precautions to keep clear of grounds.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.
Toronto, Ont., July 16, 1920.

Electric Bake Ovens

While electricity cannot take the place of coal for general heating purposes, certain industries offer a promising field for the more extended use of hydro-electric energy. One of these is in bake-shops, where the current can be used during the night, thus furnishing a valuable off-peak load. In many parts of Canada there are special low rates for electric energy used after 6 p.m. and bakers should enquire respecting this cheap rate as, in most cases, it is cheaper than other fuels. Where there are no such rates, bakers could doubtless obtain them by calling attention to the fact that, as they operate during the night, they use the energy when others do not require it. In Europe, the present abnormally high price of coal has led to the introduction of many electric ovens in countries such as Switzerland, Norway and Sweden, which are well supplied with water power. In Canada, also, their use is being extended. Even where electric ovens do not effect an actual reduction in the cost of fuel, they are frequently preferable to other types, owing to their other important advantages. The principal advantages are great cleanliness and convenience in working, the elimination of the cost of delivering coal and carting away ashes, reduction in labor costs, elimination of expenses for chimney building, the small space occupied, etc. In the case of confectionery shops, which are generally situated in the best parts of the town, ground space is a very expensive item. Quite apart from the elimination of the chimney, electric ovens occupy but little room. An electric oven with capacity for 240 loaves takes up only 35 square feet, whereas an ordinary baker's oven of the same capacity requires 125 square feet. This is an important factor in hotels that make their own bread and pastry.

Another advantage of electric bake ovens is in temperature regulation. The top and bottom heat can be separately switched on or off, or adjusted as to intensity. In this way, special kinds of pastry may be more easily baked. Electric ovens are also very hygienic; there is no smoke or soot, and, as very little heat escapes, the bakers are not inconvenienced by high temperature. The switching off of the current at night may also be done automatically.

Technical Section

The Diffusing Characteristics of Translucent Lamp Bulbs

By Geo. G. Cousins

Laboratories, Hydro-Electric Power Commission of Ontario

SINCE the introduction of electric incandescent lamps into the illumination field they have been considered as glaring light sources. The difficulties of keeping the glare within reasonable limits have steadily increased with the development of incandescent lamps until it is to-day one of the most serious problems confronting the illuminating engineer. Compared with the high power gas filled lamps of the present day it seems amusing to class the carbon lamp as glaring, but nevertheless serious attempts were made to soften its light by means of diffusing glass, and frosting and lacquering the bulbs.

Fixture manufacturers have attacked the problem by surrounding the lamps with translucent glass or opaque screens so that no direct light from the filament reaches the eyes of those using the lamps. Lamp manufacturers resort to the use of opal glass bulbs and the roughening of clear glass bulbs by etching and sand-blasting. A white diffusing lacquer has also been used to some extent and its use is being revived in the enamelled bowl Mazda "C" lamps now on the market.

When new lamps appear on the market they are generally compared with the previously existing types and the estimates of the value of the newer ones are based on the knowledge of the characteristics of the older ones. With this fact in mind some measurements of surface brightness were made on white Mazda, enamelled bowl and bowl-frosted lamps. The purpose of these lamps is to reduce the brightness per unit area of the visible light source to a value that will be more tolerable than would be the case when the naked filament is exposed to the eyes.

The white Mazda is a gas-filled lamp with a bulb of opal glass. It has a smooth surface that does not

readily collect dust and which can be easily cleaned. It emits a beautiful soft light and should be extensively used where a well diffused light is required. The enamelled-bowl lamp is as its name implies, a clear glass bulb with a white translucent enamel coated by immersion onto the bulb up to a line level with the upper part of the filament. The filament is visible through the enamel except when viewed from a direction near the tip and appears dull red in color. However in spite of this the appearance of the lamp is good. It is quite probable that the enamel will become discolored as the lamps age. Four different samples of acid frosting were included in the test and these represent the variation in surface texture that would ordinarily be met with as they include very fine to rather coarse frosting.

If a lamp bulb is of perfectly diffusing glass it will appear as a plane surface, of uniform brightness over its entire area when the lamp is lighted. If the surface is not perfectly diffusing a bright spot is seen, revealing the location of the filament and the brightness will shade off to a minimum at the edge of the bulb. By isolating small portions of the bulb surface and measuring the candle power of the light emitted by these portions the distribution of brightness over the projected area of the bulb can be determined.

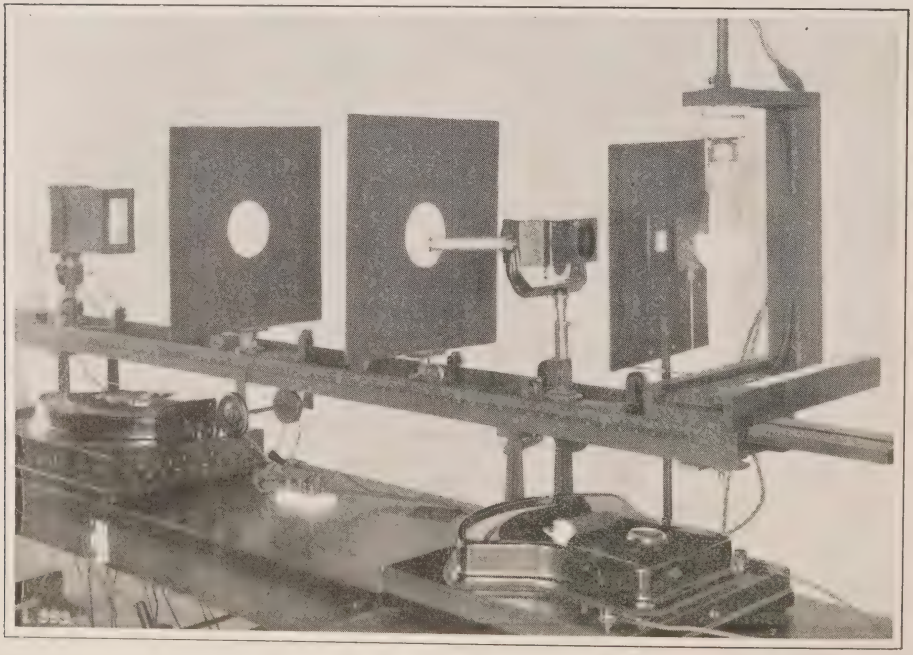


Figure 1.

Figure 1 shows the photometric set-up for making these measurements. The lamp under test is shown at the right of the photometer and is placed in a socket so mounted that the lamp and socket can be slid across the photometer track by measurable distances so selected as to give as many measurements across the bulb surface as may be desirable. A scale of inches with the zero at the centre of the track is placed upon the stationary part and the index on the movable part indicates the position of the lamp relative to the photometric axis. Between the lamp and photometer disc is placed an opaque screen with a small opening of known area cut in it in line with the photometric axis. This screen remains stationary and part of the bulb is exposed to the photometer through the opening. The candle power of the light passing through the opening is measured and the results reduced to candle power per square inch. Successive measurements are made of the centre of the lamp bulb and of several points between the centre and the edge of the bulb.

It was noticed that when making measurements of the white Mazda lamps the results were somewhat erratic, higher values of candle power per square inch were sometimes obtained at the edge than at the centre of the bulb, also that different results were obtained from different sides of the bulbs. This condition appeared to be characteristic of these lamps and its cause was found on close examination to be due to inequalities in the density of the glass at different parts of the bulb. However, by averaging the results of the three lamps included in these measurements the result is practically perfect diffusion and for practical purpose may be so considered. The average initial efficiency of six of these 50-watt lamps was 8.91 lumens per watt. The rated efficiency of the 50-watt Mazda "B" (vacuum) lamp is 9.52 lumens per watt. The white lamp is designed to replace the same size vacuum lamp in standard reflectors without appreciable change in the resulting illumination.

On Figure 2 are shown the results of the measurements of nine lamps. On account of the different lamps tested not being of equal lumens output the range of candlepower per square inch obtained from the measurements was greater than could be adequately plotted on one scale and in order to show the relative characteristics of the diffusion of the different lamps the results have been reduced to the percentage basis. The values obtained at the centre of the bulbs are taken as 100 per cent. and the values of the measurements made between the centre and the edge are plotted as percentages of the brightnesses at the centre. The actual values of candlepower per square inch are given in tabulated form in Table 1. Curves 1, 2 and 3 are white Mazda; 4 and 5, enamelled bowl; 7 and 8, fine frosting on 100 candlepower gas-filled lamps and 9 is a moderately densely frosted 100-watt vacuum lamp. The greater spread of the No. 9 curve is due to the greater area over which the filament is spread and to the greater diameter of the bulb. It is seen that none of the frosted lamps

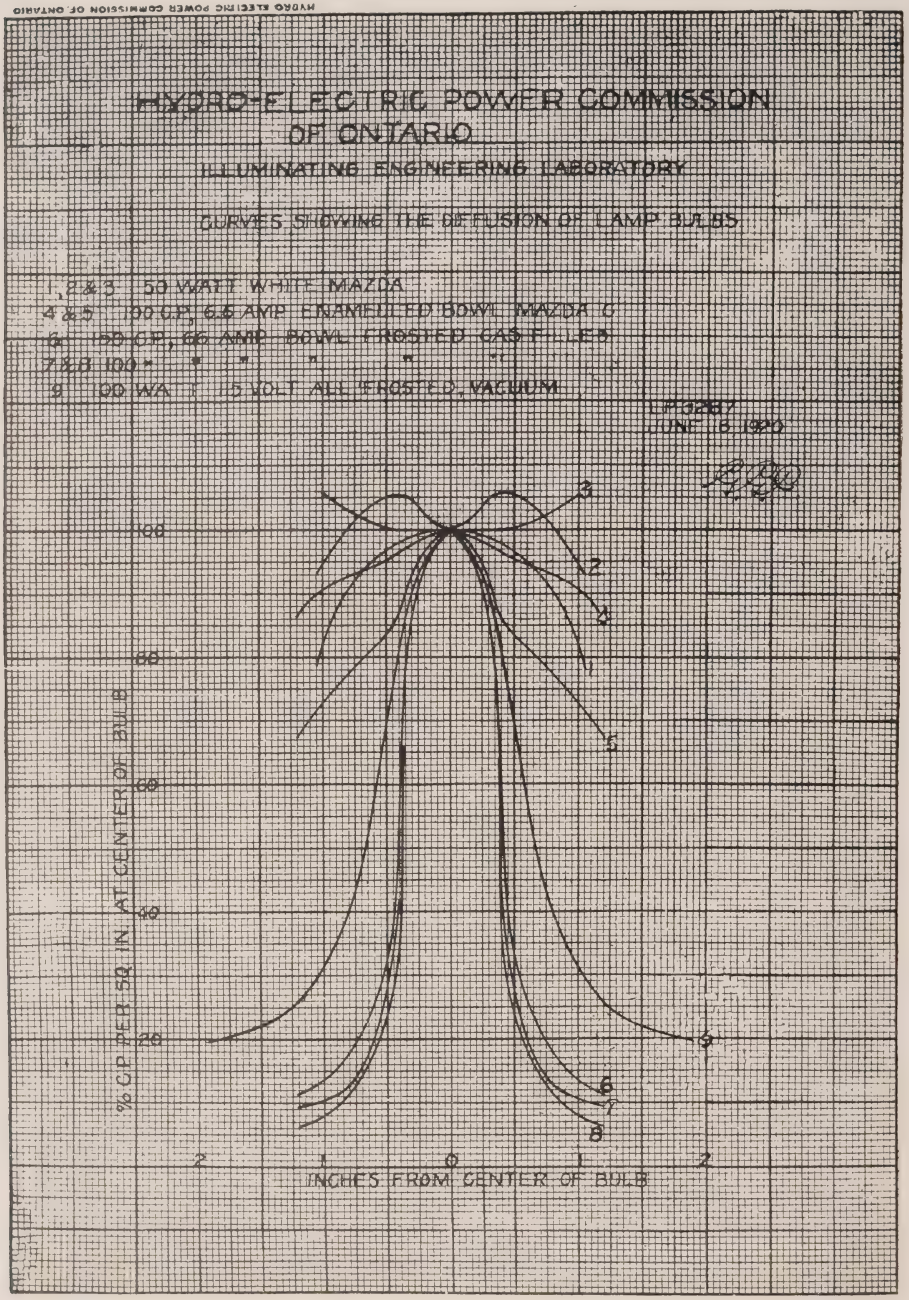

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO
ILLUMINATING ENGINEERING LABORATORY
CURVES SHOWING DIFFUSION OF LAMP BULBS
1, 2 & 3 50 WATT WHITE MAZDA
4 & 5 60 C.P., 6.6 AMP. ENAMELLED BOWL MAZDA C
6 100 C.P., 6.6 AMP. BOWL FROSTED GAS FILLED
7 & 8 100 " " " " " "
9 60 WA " 115 VOLT ALL FROSTED VACUUM
JUNE 8, 1920
100
80
60
40
20
% C.P. PER SQ. IN. AT CENTER OF BULB
2
1
0
1
2
INCHES FROM CENTER OF BULB

Figure 2.

Table No. 1

TEST OF DIFFUSING LAMP BULBS

Lamp	Distance from centre, inches	C.P. per Sq. In.
50 watt white Mazda	0.0	12.6
" "	0.4	12.4
" "	1.04	9.9
" "	0.0	10.2
" "	0.4	10.8
" "	1.04	9.5
" "	0.0	9.0
" "	0.4	9.0
" "	1.04	9.5
100 C.P. 6.6 Amp. bowl enamelled Mazda	0.0	20.2
" " "	0.4	19.5
" " "	0.8	18.8
" " "	1.2	17.4
" " "	0.0	23.6
" " "	0.4	20.2
" " "	0.8	18.2
" " "	1.2	15.9
150 C.P. 6.6 Amp. Laco bowl, frosted	0.0	111.0
" " "	0.4	63.3
" " "	0.8	19.8
" " "	1.2	12.4
100 C.P. 6.6 Amp. C.G.E. bowl, frosted	0.0	120.0
" " "	0.4	62.6
" " "	0.8	15.2
" " "	1.2	11.6
" " "	0.0	151.0
" " "	0.4	54.3
" " "	0.8	17.0
" " "	1.2	9.3
100 W. 115 V. Laco round all frosted vacuum	0.0	31.0
" " "	0.4	25.3
" " "	0.8	12.5
" " "	1.2	8.0
" " "	1.94	6.1

are comparable to the white Mazda and the enamelled-bowl lamps in the degree of diffusion produced.

The results of the tests presented here will indicate which type of diffusing lamps will serve best in reducing glare. It might be interesting to bear in mind that the enamelled-bowl lamp is in effect a small semi-indirect unit and the frosted-bowl is similar but of lesser density and the reflector action of the frosted-bowl is less than

that of the enamelled-bowl. This is mentioned because the enamel, while offering greater absorption to the transmission of light than frosting, it is more efficient as a reflector and the net result of the use of either, as regards their efficiencies, would not be appreciably different.

The enamelled-bowl lamps would be more suitable for exterior use on account of the smoother surfaces being less likely to hold dust that might blow onto them. It might be considered by many that the bowl-frosted lamps have a more pleasing appearance and the selection of either for interior use will be largely a matter of personal taste when other considerations are equal.

These machines arrived at the London Hydro Shop on May 12th, 1920, at 3.30 p.m., and they were all delivered by 6 p.m.

LONDON HYDRO SHOP

The sale of washing machines has reached considerable proportions in Ontario, and the London Hydro Shop has been particularly successful in the distribution of appliances of this kind.

An adequate repair department is maintained in connection with the Shop. The London staff takes a good deal of pride in their Hydro Shop and they try to make their service in every way outstanding in its excellence.

The Twelfth Annual Report

VOLUME I of the Twelfth Annual Report for the year ending October 31, 1919, is now off the press and is being distributed as rapidly as possible.

As usual it is a concise record of the activities of the Commission during the year, and contains tables showing the operating reports for each system and the standing of each municipality to date.

It is well understood by all readers of THE BULLETIN that the Hydro-Electric Power Commission does not sell power to the municipalities at any fixed price. What the Commission does, is to purchase or develop power and transmit it to the municipalities under contract, pro-rating the actual cost according to the demand, and the relative use of the system. While the plans followed to accomplish this are necessarily intricate, they are entirely logical and have been approved in principle and in application by the Auditors appointed by the Government to report on them.

Under a plan of service at cost it is apparent that no final definite price can be fixed in advance—so an interim billing rate is approved based on the results of operation each year, and the monthly bills rendered at that rate. This is necessary because there must be some basis for fixing the rates to the consumers during the same period. At the end of the year when the actual cost has been determined, a thirteenth or final bill or credit memorandum as the case may be, is sent to each municipality and taken up in the cost of power, so that from an operating standpoint, the Commission has no Profit and Loss account, and the local operating report and balance sheet carries all liabilities back to the source of the power.

Any surplus or deficit appearing on the Commission's books does not indicate profit or loss in the ordinary sense, but the measure by which the actual cost of service during the year ran under or exceeded the estimate on which the rate was based, and a study of these figures is of particular interest in view of the unprecedented increase in costs of both labor and material over that anticipated at the time of the signing of the armistice.

Combining all systems, the actual cost, including necessary fixed charges of interest, sinking fund, renewals and contingencies exceeded the power bills by $130,995.04 which seems a large aount until compared with the total revenue of $3,729,705.75, when it is seen that the thirteenth or final power bills increased the cost of power to the municipalities by but 3.5% a very remarkable showing under the circumstances. Had it not been for the necessary delay in changing over the equipment in a large number of munition plants in Toronto and Hamilton to peace-time production, thus materially reducing the load in these cities for the first few months of the fiscal year, the bills at first rendered in total would have exceeded the actual cost, although there are and always must be,

in a system of service at cost, some municipalities where unexpected changes in load effect the operation favorably and otherwise.

The municipalities of Collingwood, Midland and Penetanguishene maintained large munition plants and other wartime industries, during the period of the war, and the fact that peacetime industries have not yet fully absorbed the large blocks of power formerly used by these plants is indirectly responsible for the apparent deficits not only on the Severn but on the Eugenia and Wasdell's systems as well. These three systems are all tied together for operating purposes and the Wasdell's plant, having no storage was most efficiently operated by running to capacity day and night, all available surplus energy being transferred to the Severn. This enabled the Eugenia Plant to conserve its storage water, and increased the amount of energy which it was able to transfer to the Severen during the peak load period. The net result has been that none of these plants were run to maximum capacity, resulting in an increase in the cost per horse power over the estimate. The remedey is obviously additional load, which is already in sight. The net deficits on these three systems for the year are:

Severn	$44,426.89
Eugenia	8,459.39
Wasdell's	1,901.01
Total	$54,787.29

or approximately 17.1% on the total collections, and which has already been incorporated in the municipal accounts.

The actual cost of power on the Muskoka System exceeded the billing by $2,469.32, largely due to the inability of the present power plant to deliver the amount of power for which there is a demand. Additional equipment for this development is now under consideration.

From the municipal standpoint, the general condition continues eminently satisfactory. Out of a total of 183 municipalities 117 were able to meet all operating, maintenance and fixed charges and in addition provide full depreciation. Twenty-five additional show a gross surplus, but not sufficient to meet full depreciation, while 41 show an actual deficit, or a revenue, insufficient to meet all expenses other than depreciation. In every case any deficit on the books of this Commission has been taken up in the municipal books as a direct operating expense.

The combined operating report for all municipalities shows a net surplus, after providing for full depreciation, of $481,353.52, and the accumulated surplus and reserves has now reaeched the magnificient sum of $4,216,909.08.

The following condensed composite balance sheet shows in a graphic manner, the satisfactory financial condition of the Municipal Hydro-Electric Utilities on December 31, 1919.

ASSETS

Plant	$24,298,866.28
Cash	59,201.66
Investments	627,076.53
Accounts and Inventories	2,389,134.89
Sinking Fund on Local Debentures	1,925,455.77
Sinking Fund Equity in H.E.P.C. System	369,071.89
Other Assets	86,216.05
H.E.P.C. Operating Account	281,379.93
TOTAL	$30,036,403.00

LIABILITIES

Debenture Balance	$18,133,462.44
Accounts Payable	1,137,705.04
Other Liabilities	670,271.90
Sinking Fund Reserve	1,754,020.37
Reserve for Equity in Hydro System	373,871.89
Depreciation Reserve	3,750,162.28
Miscellaneous Reserves and Surplus	4,216,909.08
TOTAL	$30,036,403.00

Practically all of the investments consist of Victory War Loan purchased by the municipalities out of surplus cash, but it will be noted that there are still very large balances of cash on hand. In two or three instances, securities have been purchased with the unexpended portions of debenture proceeds, but generally the cash and investments represent surplus earnings in excess of the amounts required for normal plant extension.

Antagonistic interests have always endeavored to create the impression that Hydro success is due to contributions from municipal finances for street lighting, making it possible to sell light and power at less than cost and thus effectively throttle competition. The following figures are interesting when considered in this connection:

Year	Number of Municipalities	Total Revenue	Street Light	Per cent. of street light to total Revenue
1913	45	$2,617,439.51	$560,925.56	21.4
1914	69	3,433,656.16	698,409.71	20.3
1915	99	4,070,295.28	835,970.87	20.5
1916	128	4,983,601.03	930,057.48	18.4
1917	143	6,070,065.17	967,495.10	16.0
1918	166	7,082,039.16	902,875.55	12.7
1919	181	7,827,054.60	988,900.95	12.6

It will be noted that the street lighting revenue in 1919 is approximately the same as in 1916, while during this same period the total revenue increased by nearly 64 per cent. The actual street lighting is less than the amount shown as these figures do not take into account the refunds from surplus which have been made in many municipalities during the past few years. While these charges have never been taken seriously it is well to know just how little foundation in fact there ever was for them.

Operating Data on Large Shovels at Queenston Development

RECORDS made in excavating the Queenston-Chippawa power canal by the Hydro-Electric Power Commission of Ontario have fully shown the value of large electric shovels. Over 20,000 cubic yards of earth and rock are removed daily in digging this canal, the major portion of this being accomplished by means of three 8-cubic yard electric shovels.

Not only have the volume records indicated the success of these shovels —which, by the way, are the largest in the world—but the operating economies have also proved conclusively the value of this equipment.

The operating economies were found by making a thorough test of shovel No. 1 while being used as shown in Figure 1. This Bucyrus shovel is of 300 tons weight, has a 90-foot boom, uses either 5, 6 or 8-cubic yard bucket, and works on a 40 to 50-second cycle of operation. There are four Westinghouse 440-volt, 3-phase, 25-cycle motors in this shovel, used as follows: Two 250-horsepower motors for hoist; one 150-horsepower motor for thrust; and one 150-horsepower motor for swing. The controllers are of the master-switch, magnetic type, and the whole operation is handled by two men. This shovel was working 90 feet below the surface and loading material on cars approximately 70 feet above its own base when the photograph reproduced in Figure 1 was taken.

RESULTS OF TEST ON WORLD'S LARGEST ELECTRIC SHOVEL, QUEENSTON-CHIPPAWA POWER DEVELOPMENT

Total yards, whole test	24,706.5
" " day work only	15,380.0
" " day and night	9,326.5
Kilowatt-hours, whole test	20,436.0
" " day work only	12,216.0
" " day and night	8,220.0
K.w.h. per yard, whole test	0.826
" " day work only	0.794
" " day and night	0.882

Tests were made with a graphic wattmeter connected in the 4,000-volt circuit near the shovel. A high-speed clock in the meter allowed the chart paper to pass the pen at the rate of about 5.5 inches per minute. Figure 2 is a typical load curve of the shovel taken while loading three trains during one morning of the test. A check was made against the chart by noting

Figure 1—Bucyrus Shovel Working Against 90-foot Cliff During Power Consumption Test

the starting time of each operation during the entire test. The test covered a period of seven days, work being done only during the day for the first five, and both day and night for the last two.

From the accompanying table it is seen that the power required for each cubic yard dug and lifted 70 feet and loaded into a car, was approximately 0.8 kilowatt-hour.

The graphic chart shows the energy consumption under actual working conditions and gives an accurate figure for energy consumption per cubic yard excavated. Fifty seconds were required to make the entire cycle. During this period a maximum power demand of 800 horsepower was reached. The average was 320 horsepower for the entire cycle.

An interesting feature of the operation of these shovels is the fact that regenerative braking is utilized whenever possible. In this particular instance it is used when the shovel is lowered the 70 feet after it has been raised that distance in order to load the cars. This is accomplished as follows: When the operator is ready for the bucket to come down, the motors are connected to the power supply and the bucket falls with the motors running at slightly above synchronous speed. When such a condition is reached, the motors operate as induction generators. Although, as can be seen from the curve, some energy is generated and pumped back into the line, this item is not the main

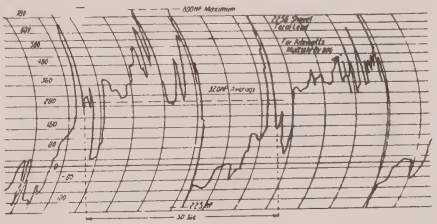


Figure 2—Typical Load Curve

feature of this operation. This method of lowering saves mechanical wear and tear, as the brakes are required only for stopping and holding the bucket, requiring less repair work and making the whole equipment more reliable.—*Canadian Engineer.*

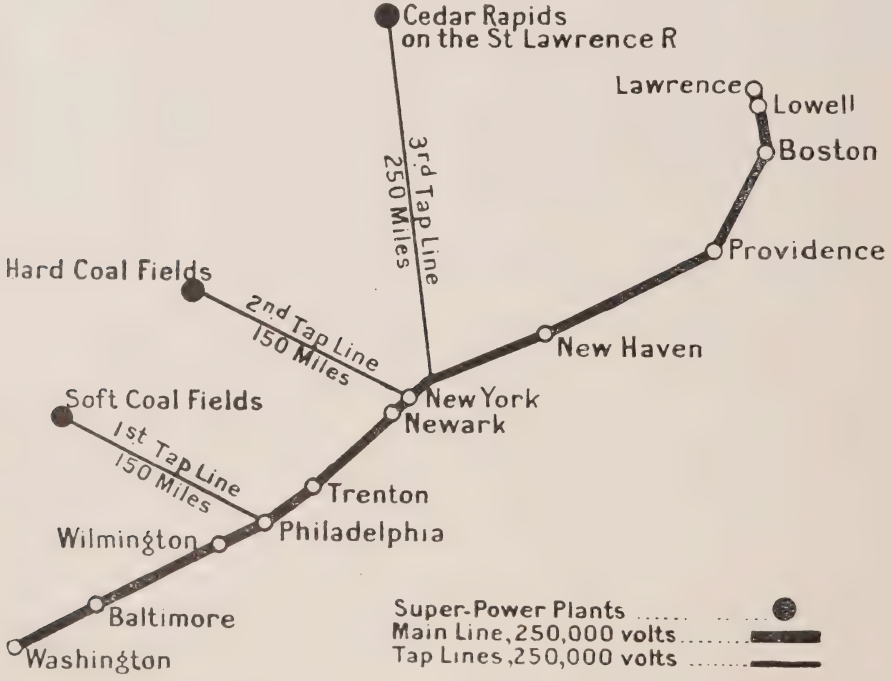
An electric alarm has been invented that sounds should an unauthorized person move a baby carriage or try to remove its occupant.

To prevent solder pots used by linemen from upsetting, a Chicago man has invented a spiral hook for their handles, which cannot slip off.

Power to New York from the St. Lawrence

AT A RECENT meeting of the American Institute of Civil Engineers, Mr. Percy H. Thomas, a prominent expert authority on long distance transmission, urged the construction of super-power stations to generate electric energy to supply Boston, New York, Philadelphia and Washington and intermediate cities. To achieve this, he suggested that electric energy be obtained from the Cedar Rapids of the St. Lawrence and that "super power" plants be erected at the anthracite and bituminous mines of Pennsylvania.

The area it is proposed to supply with electric energy is the most populous and highly developed industrial section of the United States. Such supply would only be possible by the use of a higher voltage than heretofore considered practicable, 250,000 volts, which permits the transmission of electric energy over distances hitherto believed to be beyond economic range. The scheme is of particular interest to Canada, as the proposed market could readily absorb all the power produced by the Long Sault as well as the surplus from Cedar Rapids.



PROPOSED SUPER-POWER SUPPLY,
WASHINGTON - NEW YORK - BOSTON

Mr. Thomas, in presenting the scheme, stated that the most important advantages of the project are the conservation of coal and the relief of railways from the burden of hauling it. To conserve fuel most effectively requires both the development of as much water-power as may be economically justified and the burning of coal in the most economical manner, as well as the use of low grades of coal. Other advantages are mutual support and interchange of power between the various plants, leading to cheaper production.

The proposed system consists of a main 250,000-volt line, connecting Washington with Boston, via Baltimore, Wilmington, Philadelphia, Newark, New York, New Haven and Providence. This line would be fed from a group of large stations at the nearest bituminous and anthracite coal-fields. Each group of such powers would feed the main line through a tap line. The energy generated in the suggested large plant or group of plants on the St. Lawrence River would feed the main line by another tap line about 250 miles long which would connect with the main line probably where it crossed the Hudson River. The total distance to New York will be about 300 miles.—*L. G. Denis.*

A practical Swiss has converted an Alpine glacier into an ice mine, blasting out and marketing the product.

India's first aerial mail service has been established, three aeroplanes being in use between Bombay and Karachi.

Dry Powder Fire Extinguishers

Although dry-powder fire extinguishers are sold to a gullible public in increasing numbers, they are all, without exception, practically worthless. Tubes costing $3 each contain materials having an average value of eleven cents. Chemical analysis of thirty-one tubes of various makes shows the contents to consist of approximately 60 per cent. common baking soda, 26 per cent. fine sand, 8 per cent. pulverized chalk and 4 per cent. coloring matter, chiefly iron oxide. The inefficiency of dry powder extinguishers was made the subject of searching investigation by a special committee appointed by the British Home Office in March, 1916. Their report contained the following statement: "The use of dry powder fire extinguishers is to be deprecated as not only giving a misleading sense of security, but being practically useless for extinguishing or controlling fires."

Of an entirely different character are the small one-quart chemical extinguishers sold under different proprietary names, but all containing carbon tetrachloride as the extinguishing fluid. These have the great advantage of being easily handled by women and children. When subjected to heat, carbon tetrachloride generates a heavy, non-inflammable gas that will extinguish fires under circumstances where water would be useless.—*J. Grove Smith.*

Artesian well drillers in Argentina discovered a rich deposit of copper where none was known to exist.

The Numbering of Watthour Meters

By J. F. McGregor,

Secretary, Water and Light Commission, Campbellford, Ontario

THE BULLETIN, I am led to believe, is a publication in which a free discussion of electrical matters is invited, and, acting on this assumption I should like to make a suggestion in regard to the local numbering of watthour meters—and in doing so, perchance I may cause others, who have been in the electrical business a long time, to express their opinions and thus help those who have not been privileged with the same wide experience.

Now to begin, I may say that our electric system is an independent municipal plant, but we are more or less intimately connected with the Hydro-Electric; however, we have not progressed at the same rate, so that it is just within the last two years that the sale of electric current has been put on a meter basis.

From the above it will be seen that making this change entailed the handling of a lot of meters in a short time, but unfortunately (for the office staff at least) a proper record was not kept, due to the fact that those entrusted with the installing of the meters were very indifferent as to whether a meter had received its local number or not Apparently, if there was not some one handy to do the numbering, the meters were installed any way, with the result that when the time came to fill out the Government Meter Register Book, great difficulty was experienced in obtaining the necesasry information, so that the return could not be made to the Government Meter Inspector.

It is apparent that the intention of the Department of Trade and Commerce is that all meters are to carry a local number, and this being the case, why is there not some better and more convenient method of accomplishing this than by painting the numbers on the meters? It seems to me that the manufacturers could help out in this matter by making some provision for this local numbering. As it stands, it looks as if the manufacturers wanted to make it as difficult as possible to paint or stencil numbers on the front of a meter, for if the meter is not a glass-covered one, but has a metal cover, between the name-plate and the embossed lettering, there is no available space left, so there is nothing for it but to paint the numbers on this uneven surface (a mean job at best) or else to paint the number on the side, which makes the reading of the number difficult and very uncertain unless a step-ladder is used.

Now I notice that the "Electrical Meterman's Hand Book" has something to say in regard to meter numbering, and, quoting from this book I find this remark: "Many of the larger electric supply companies use an aluminum number strip riveted to the case of the meter." This may be all very well for the large plants, but

what about the smaller ones that do not have the facilities for doing this? It is just here that I think the manufacturers could help out, and this is what I would like to suggest—that the meter manufacturers could provide meter numbers, or, even if they did not go this far, but simply made provision for attaching metal numbers. If the manufacturers could be induced to take hold of this matter it would only add a cent or two to the production cost per meter, and would in my opinion be a great saving and convenience to the central stations.

Let us suppose that the meter manufacturers provided neat, attractive meter numbers, which would either be enamelled or pressed aluminum, attaching to the meter by the wing nuts which hold the meter cover in place or by small projecting studs, or even a grooved metal strip under which the numbers could be slid. Would not this be an improvement to the appearance of the meter, to say nothing of the permanency of this method of numbering.

In looking around, I have seen meters numbered by hand which looked altogether too much like the home made sign which a person sometimes sees stuck in a house window or on a lawn reading, "Boarders Wanted." Then again, as said at the outset, we have only been using meters for about two years, yet we found in some cases that the painted numbers were fast becoming obliterated. This could not possibly happen if aluminum or other metal numbers were used. One other feature of the metal numbers—if attached in the right way—is the ease with which a number could be changed should a mistake occur at the time the meters were being inspected by the Government. We had an experience along this line in that the Meter Inspector scratched one number on the side of the meter and entered up a different number in his field notes, and of course the painter followed suit by painting on the same number as the Meter Inspector had scratched on the case. When the mistake was detected the question was how to get out of the difficulty—to erase the painted numbers or to have the Meter Inspector change his record? We chose the former method as the numbering had not proceeded far before the mistake was found. However, if we assume that several meters had been wrongly numbered, one can readily imagine how great the confusion would have been and the trouble that would have been caused by going over the painted numbers. If metal numbers were used these could be changed quickly as the occasion demanded.

Recently we received word from the Government Meter Inspector that he was not going to scratch any more numbers on the meters, and that meters would have to be ready with the local numbers on them before he would make an inspection. This means that we have to be prepared two or three days ahead, otherwise the fresh paint would almost surely be rubbed or smudged, with the attending result of a defaced number. If metal numbers could be bought and attached the meters could be inspected the same day that they were received.

In other lines of business, where lettering or numbering is required, generally some provision is made for this purpose. If we go to a power house we find the panels of the switchboard provided with card-holders; if we buy a good filing cabinet the trays will have card-holders. Seldom, if ever, do we even see a painted street number on a house, but a regular number, made for that particular purpose—and even if we peep inside the house to where the pet dog lies curled up on the rug, I'll venture to gamble that no painted number will be found attached to him—yet when it comes to meters, a painted number seems to be good enough.

It seems that with the large number of meters in use all over the country there is a field for a better method of numbering meters, and if the electric power people made up their minds to ask for metal numbers, these would be readily forthcoming. If the manufacturers would meet the situation, at least half-way, by making it possible to readily attach numbers, the rest would soon follow, and possibly the Hydro Production Department could take hold of the number business as a side-line and the matter would be thus taken care of.

I should like to hear what others have to say along this line.

CENTRAL POWERS STATIONS

The present coal consumption, *for power purposes,* in the United Kingdom is at least 80,000,000 tons yearly. By proper co-ordinated and centralized systems of power production and distribution for the whole country, it is estimated that 55,000,000 tons of coal per annum might be saved, in addition to other important advantages.

To move automobiles laterally in garages a low-wheeled platform has been invented that is propelled by an electric motor taking current from an overhead wire.

Extension of hydro-electric projects in Japan will involve the building of about 1,000 miles of high-tension lines within the next two years.

Canada produces per capita more food materials obtained from farm crops than any other country.

Canada has the largest grain mills in the British Empire.

HYDRO NEWS ITEMS

St. Lawrence System

GENERAL—The growth of load on the St. Lawrence System has been most satisfactory during the past two years, and there is every indication that a great impetus is being given to commercial activity in the East by the shortage of power in the Niagara District.

The Toronto Paper Company, which manufactures its product in Cornwall, has been taking about 500 horsepower from the Commission, but this company has lately decided to make this plant its headquarters in Canada, and has notified the Commission that it will require an additional 1,500 horsepower within the next two months. In addition they inform us that a further block of 1,000 horsepower will be required in approximately six months, making a total of 3,000 horsepower to be taken by this company.

This will necessitate a number of changes in our sub-station at the company's plant, and the present 750 Kva. transformer will probably be replaced by a 1,500 Kva. unit, and a further 1,500 Kva. unit installed at a later date. It is estimated that within two years this company alone will need 5,000 horsepower. Other inquiries have also been received for large blocks of power from intending pulp manufacturers. The new Alexandria-Maxville District is now well under way, and this will soon be added to the St. Lawrence System.

A good beginning has been made on the high-tension line between the sub-station at Cornwall and Alexandria. All poles are erected as far as Grants Corners, which is about six miles from the sub-station, and before the end of the month it is expected that all poles will be erected as far as Martintown, and that the line will be into Alexandria in from two to three months.

Rideau System

GENERAL—Steady increase of power consumption has been maintained on the Rideau System, and the load is at present about 2,000 horsepower. All municipal plants have now been shut down, and the load is being carried by our High Falls Plant and a small amount by the Rideau Power Company. All the generating units at High Falls are now ready for use, and it is hoped to add the villages of Kemptville and Lanark to this system within the coming year.

Ottawa District

GENERAL—In the Ottawa District, in response to a large petition, the Commission has just completed surveys of Nepean and Gloucester Townships.

Eugenia System

BRUCE COUNTY EXTENSION—Good progress is being made in connection with constructing the transmission line west from the Municipality of Hanover to serve the municipalities in the Bruce County District. The Commission has placed an order for a pole-erecting machine which will be used on these lines as soon as delivered. It is expected that one mile of poles per day can be erected cross-armed by this machine, and as soon as it is placed in operation much more rapid progress will be made in connection with constructing the transmission lines in this district.

DURHAM—The Local Commission is constructing extensions to the distribution system in this municipality to take care of service to three additional power customers, the total connected load of which will approximate 150 H.P.

HANOVER—The sub-station in the Municipality of Hanover is being enlarged to take care of a considerable increase in load in this municipality and three 125-Kva. transformers are being replaced by two 750-Kva., 3-phase transformers. Additional power loads have been secured in this municipality of over 600 H.P.

LUCKNOW—The Commission's engineers have completed preliminary investigations in connection with constructing a distribution system in this municipality and have staked out on the town streets all of the pole locations for the new distribution system which will be constructed for the purpose of distributing Hydro-Electric service to the consumers from the Bruce County Extension of the Eugenia System.

NEUSTADT—Arrangements are being made by the Commission to reconstruct the transmission line between Hanover and Neustadt to take care of increased loads in the latter municipality. The present conductor is No. 6 hard-drawn copper, and will be replaced with No. 3/0 aluminum. The load in the Municipality of Neustadt during the year 1918, when service was first given, averaged approximately 18 H.P. The load by September, 1920, in this municipality will probably exceed 200 H.P.

Wasdell's System

KIRKFIELD—The local distribution system in the Village of Kirkfield was made alive on June 18th, and this municipality is now being served from the Wasdell's System. Service is given from the sub-station serving the Crushed Stone, Limited, located about three mines northeast of the village.

Muskoka System

BRACEBRIDGE—The Municipality of Bracebridge has requested the Commission to submit a report concerning the cost of power to this municipality and to make an analysis of the local rates so that a proper charge may be determined in connection with resale to consumers. Estimates have been prepared and submitted to the municipality covering the delivery of 200 H.P. to Bracebridge from the Muskoka System.

GRAVENHURST—The Municipality of Gravenhurst has secured an additional customer, which will increase the power demand in this municipality by 125 H.P.

Nipissing System

GENERAL—The Commission's engineers have been preparing plans covering an extension to this system involving the installation of a 1,400-Kva. generator and a 750-Kva. transformer. The Hydraulic Department has just about completed the installation of a number of storage dams on the various branches of the South River, which will enable the Commission to take care of the loads on the Nipissing System throughout the year from the hydraulic plant, and thereby dispense with the auxiliary steam plant at North Bay.

Severn System

BARRIE—Arrangements have been completed between the Local Commission and the Grand Trunk Railway for supplying the Railway's terminals at Allandale with Hydro-Electric power. The total demand of the Railway at this point will approximate 100 H.P.

MIDLAND—Negotiations have been proceeding for some time past between the Commission and the Grand Trunk Railway on behalf of the Town of Midland in connection with supplying the G.T.P. elevator with 1,000 H.P.

Of English invention is a pump which raises water with an endless chain surrounded by a spiral coil that holds the water by capillary attraction.

Canada's wool yield (1919) was 17,300,000 lbs., both quantity and quality above the average.

A new cheque-writing machine prints everything but the signature in a manner that is claimed to prevent alteration.

Telephones small enough for both transmitter and receiver to be carried in a vest pocket have been invented in Holland.

Machinery has been invented that sprays concrete on the interior of tunnels and almost immediately smooths it in place with swinging arms.

As a substitute for gasoline an English engineer has designed small gas producers to be carried on automobiles or motorboats.

NOTICE

TO ELECTRICAL MANUFACTURERS, JOBBERS AND DEALERS

Electrical material, devices and fittings for use on inside electrical installations in the Province of Ontario, *must not be offered for sale* until their design and construction has been approved by the Hydro-Electric Power Commission of Ontario. (6 Geo. V., Chapter 19, 1916)

Manufacturers whose products are approved and listed by other recognized authorities, and which also meet the requirements of this Commission, may have same placed on the approval list by making application in accordance with Approval Laboratories' Bulletin No. 5, a copy of which will be sent upon request.

ONTARIO DEALERS' ATTENTION IS CALLED TO THE FOREGOING REGULATION—WHICH PROHIBITS THE SALE OF UNAPPROVED ELECTRICAL DEVICES.

APPROVAL LABORATORIES

HYDRO-ELECTRIC POWER COMMISSION
OF ONTARIO

8 STRACHAN AVENUE, TORONTO, ONTARIO

HYDRO MUNICIPALITIES

NIAGARA SYSTEM

Acton	1,563
Ailsa Craig	447
Ancaster	400
Ancaster Township	4,621
Aylmer	2,177
Ayr	809
Baden	710
Barton Township	8,029
Beachville	503
Biddulph Township	1,763
Blenheim	1,533
Bolton	675
Bothwell	700
Brampton	4,238
Brantford	28,725
Brantford Township	8,061
Breslau	500
Brigden	400
Burford	700
Burford Township	3,845
Burgessville	300
Caledonia	1,150
Chatham	15,030
Chippawa	1,095
Clinton	1,948
Comber	800
Copetown	230
Dashwood	350
Delaware	350
Dereham Township	3,233
Dorchester	400
Dorchester S. Twp.	1,389
Drayton	622
Dresden	1,413
Drumbo	400
Dublin	218
Dundas	5,078
Dunnville	3,402
Dutton	858
Elmira	2,238
Elora	1,122
Embro	481
Etobicoke Township	6,586
Exeter	1,431
Fergus	1,609
Flamboro E. Twp.	2,443
Forest	1,418
Galt	12,558
Georgetown	2,010
Glencoe	865
Goderich	4,562
Grantham Township	3,242
Granton	300
Guelph	16,974
Hagersville	1,058
Hamilton	110,137
Harriston	1,381
Hensall	715
Hespeler	2,929
Highgate	379
Ingersoll	5,278
Kitchener	19,767
Lambeth	350
Listowel	2,437
London	58,421
London Township	5,744
Louth Township	2,214
Lucan	640
Lynden	662
Markham	813
Merritton	2,358
Milton	1,750
Milverton	929
Mimico	2,490
Mitchell	1,672
Moorefield	335
Mount Brydges	500
New Hamburg	1,356
New Toronto	2,551
Niagara Falls	12,424
Niagara-on-the-Lake	2,014
Norwich	1,262
Norwich N. Twp.	2,011
Norwich S. Twp.	1,814
Oil Springs	548
Otterville	500
Palmerston	1,815
Paris	4,866
Parkhill	1,202
Petrolia	2,954
Plattsville	550
Point Edward	984
Port Colborne	2,987
Port Credit	1,100
Port Dalhousie	1,391
Port Stanley	732
Preston	4,966
Princeton	600
Ridgetown	2,180
Rockwood	650
Rodney	656
Sandwich	3,448
Sarnia	12,178
Scarborough Twp.	6.566
Seaforth	2,027
Simcoe	3,818
Springfield	426
St. Catharines	19,189
St. George	600
St. Jacobs	400
St. Mary's	3,807
St. Thomas	17,209
Stamford Township	3,702
Stratford	17,143
Strathroy	2,687
Streetsville	475
Tavistock	917
Thamesford	504
Thamesville	808
Thorndale	250
Tilbury	1,623
Tillsonburg	2,788
Toronto	489,681
Toronto Township	4,782
Townsend Township	3,291
Vaughan Township	4,090
Walkerville	5,914
Wallaceburg	3,992
Waterdown	790
Waterford	985
Waterloo	5,105
Waterloo Township	6,378
Watford	1,075
Welland	9,876
West Lorne	700
Wellesley	583
Weston	2,495
Windsor	29,344
Wodbridge	600
Woodstock	10,051
Wyoming	495
Zurich	450
Total	1,122,828

SEVERN SYSTEM

Alliston	1,224
Barrie	6,775
Beeton	492
Bradford	866
Camp Borden	.....
Coldwater	584
Collingwood	7,949
Cookstown	635
Creemore	615
Elmvale	775
Midland	7,339
Orillia	8,058
Penetang	3,664
Port McNichol	564
Stayner	870
Thornton	250
Tottenham	475
Victoria Harbor	1,496
Waubaushene	600
Total	43,231

WASDELL'S SYSTEM

Beaverton	932
Brechin	215
Brock Township	2,871
Cannington	818
Eldon Township	2,085
Gamebridge	.....
Kirkfield	.....
Mara Township	2,486
Sunderland	570
Thorah Township	1,116
Woodville	400
Total	11,493

NIPISSING SYSTEM

Callander	650
Nipissing	400
North Bay	9,413
Powassan	519
Total	10,982

MUSKOKA SYSTEM

Gravenhurst	1,502
Huntsville	2,113
Total	3,615

EUGENIA SYSTEM

Alton	700
Artemesia Township	2,392
Arthur	1,027
Chatsworth	257
Chesley	1,703
Derby Township	1,577
Dundalk	700
Durham	1,500
Elmwood	500
Flesherton	378
Grand Valley	558
Hanover	3,225
Holstein	285
Horning's Mills	350
Kilsyth	.....
Markdale	925
Mount Forest	1,716
Neustadt	412
Orangeville	2,173
Owen Sound	11,768
Shelburne	970
Tara	520
Total	33,636

OTTAWA SYSTEM

Ottawa	104,007

THUNDER BAY SYSTEM

Port Arthur	15,100

CENTRAL ONTARIO SYSTEM

Belleville	12,345
Bloomfield	500
Bowmanville	2,853
Brighton	1,387
Cobourg	4,835
Colborne	939
Deloro	347
Deseronto	2,117
Kingston	23,737
Lindsay	7,880
Madoc	1,146
Millbrook	746
Napanee	2,864
Newburgh	426
Newcastle	552
Omemee	467
Orono	700
Oshaw	9,748
Peterborough	20,904
Picton	3,257
Port Hope	4,311
Stirling	823
Trenton	6,107
Tweed	1,292
Wellington	802
Whitby	3,471
Total	114,556

ST. LAWRENCE SYSTEM

Brockville	9,418
Chesterville	925
Prescott	2,660
Williamsburg	100
Winchester	1,047
Total	14,150

RIDEAU SYSTEM

Carleton Place	3,844
Perth	3,545
Smith's Falls	6,356
Total	13,745

ESSEX COUNTY SYSTEM

Amherstburg	2,386
Canard River	50
Cottam	100
Essex	1,753
Harrow	375
Kingsville	1,567
Leamington	3,907
Total	10,138

THOROLD SYSTEM

Thorold	4,325

Frequencies: Niagara and Thorold Systems—25 cycles; all other Systems—60 cycles.

THE aim of The Bulletin is to provide municipalities with a source of information regarding the activities of the Commission; to provide a medium through which matters of common interest may be discussed, and to promote a spirit of co-operation between Hydro Municipalities.